impact of Hilbert's ideas, and Toepell alludes to them, thereby giving his own book a usefully tight focus. For the same reason, discussion of the Italian writers (Peano, Pieri, and Veronese) is slight, although Toepell does suggest (p. 57) that the language barrier may not have been as impenetrable as some have claimed. In short, Toepell has written well and clearly about a wealth of material never before published, and has provided us with extensive quotations from it, thus enabling us (as Toepell puts it on p. 265) "to see the master in his workshop." For that we are considerably in his debt.

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The Śulbasūtras of Baudhāyana, Āpastamba, Kātyāyana and Mānava with Text, English Translation and Commentary. By S. N. Sen and A. K. Bag. New Delhi (Indian National Science Academy). 1983. viii + 293 pp. Rs. 85, $30.

Reviewed by David Pingree

Department of History of Mathematics, Brown University, Box 1900, Providence, Rhode Island 02912

This edition presents the Sanskrit texts (in transliteration) of the four major śulbasūtras or treatises on the geometry of the construction of Vedic altars, together with new and reasonably accurate translations and competent commentaries. It joins the ranks of a number of similar editions of the śulbasūtras that have been produced in India in recent years. These include the edition of the *Baudhāyana* by S. Prakash and R. S. Sharma (New Delhi, 1968; reprinted New Delhi, 1980); that of the *Kātyāyana* by S. D. Khadilkar (Poona, 1974); and that of the same four śulbasūtras as are contained in the volume under review, by S. Prakash and U. Jyotishmati (Allahabad, 1979). None of these editions is referred to at all by Sen and Bag. Perhaps they finished their work before some of these editions appeared, and also before some other important contributions to the study of the śulbasūtras that they have ignored, such as those by R. P. Kulkarni (*Geometry According to Śulba Sūtra* [Poona, 1983]), A. Michaels (*Beweisverfahren in der vedischen Sakralgeometrie* [Wiesbaden, 1978] and *A Comprehensive Śulvasūtra Word Index* [Wiesbaden, 1983]), and T. A. Sarasvati (*Geometry in Ancient and Medieval India* [Delhi, 1979], pp. 14–60).

Had they been able to consult some of these books, the authors might not only have improved their texts and their understanding of them in several places, but would have realized as well that several of the other śulbasūtras that they name actually *do* still exist and could have been considered in their edition—certainly the *Maitrāyaṇıya* and the *Satyaṣaḍha*, and possibly the *Varāha* and the *Vādhūla* of which it is rumored that manuscripts still survive.

It is indeed a pity that they included in their study neither these texts nor the many commentaries on the śulbasūtras, some of which have been published though many have not. To be sure, the mathematics of the śulbasūtras have been well understood since the late 19th century; Sen and Bag necessarily can offer little improvement over their predecessors in this area. But the history of the śulbasūtras has yet to be thoroughly worked out: the origin of this curious application of geometry to the building of altars, the development of this science within the Indian tradition, and the histories of the individual texts are all topics needing to be addressed. But on all of these important questions the authors have little to say that is new, though what they do say is quite reasonable.

They do make an effort to point out the anticipations of the śulbasūtra rules found in earlier Vedic texts (pp. 5–8); more material of this sort has been assembled by Kulkarni (*Geometry*, chapters II–III). The question of the origin of this geometry, however, and its relations both to Mesopotamian mathematics and to a Vedic craft tradition seems to me to be yet unanswered.

Relevant to that question is the historical problem of when Indians actually began to build altars according to the rules of the śulbasūtras. I strongly suspect that the geometry was not invented to provide the priests with a technical means of meeting their rather arbitrary rules for the construction of altars, but rather that the rules were devised to utilize an existing constructive geometry. Kulkarni has shown that some of that geometrical knowledge did exist in Vedic times; while archaeology demonstrates that, as far as is presently known, the earliest of the massive brick structures described in the śulbasūtras was built at Kauśāmbī only in the second century B.C. (G. R. Sharma, *The Excavations at Kauśāmbī (1957–59)* [Allahabad, 1960], pp. 87–126), centuries after the assumed date of the *Baudhāyanaśulbasūtra*. Sen and Bag remain completely silent on the problem of the relation of the śulbasūtras to the surviving altars uncovered by the archaeologists.

The textual interrelationships of the existing śulbasūtras have been investigated by Michaels, but these interrelationships have not yet been placed within an historical framework. Indeed, before that can be done the history of the individual texts and of their commentaries needs to be established. The editions of all of the śulbasūtras that have been published so far (except for the relatively rare *Mānava*) have been based on only a small fraction of the extant manuscripts. Sen and Bag have examined one manuscript of the *Kātyāyana*, though they report none of its readings, and two of the *Mānava*, both of which were already used in the edition by van Gelder. The hundreds of other manuscripts of these texts have yet to be explored. Moreover, the authors have completely ignored the commentaries except for a handful of references to those that have been published. One hopes that the next "edition" of the śulbasūtras will pay more serious attention to the need for and the needs of textual criticism. If Indology is to make progress, it must begin to deal with the wealth of material that awaits investigation in Indian and non-Indian libraries.

Statistics in Britain, 1865–1930: The Social Construction of Scientific Knowledge. By Donald A. MacKenzie. (Edinburgh University Press). 1981. VIII + 306 pp.

Reviewed by Ivo Schneider

Institut für Geschichte der Naturwissenschaften der Universität München, Munich, Federal Republic of Germany

I begin my review with a confession. I find the book very attractive but for reasons which are different from the author's intentions. Why this is so, I shall try to explain.

Statistics in Britain, 1865–1930 is a topic of great interest for historians of mathematics. This interest is due in part to the lack of monographic literature on this crucial period in the formation of modern statistics. Moreover, the development of modern statistics seems to offer a case study for the formation of a discipline. According to the subtitle of the book, this process is to be understood as "social construction."

Whether one argues as Helen Walker did in her *Studies in the History of Statistical Method* [1929] that statistics is an offspring of probability theory, especially error theory, or if one pleads for a more independent genesis of statistics because the methods of error theory more than once proved inadequate for the solution of the problems of biometrics, statistics as it developed after 1900 shares with probability theory the status of an applied science.

As a mathematical discipline in its own right, probability theory figured little up to the late 1920s. It lacked both a clear foundation and methods of its own; most of the mathematical tools of 19th-century probability theory were borrowed from analysis. It could boast the solution of few problems outside the classical domain of games of chance. The most promising domain of application at the turn of the century appeared to be physics, especially statistical mechanics. According to Hilbert at least—who in 1900 called probability theory a physical discipline because statistical mechanics seemed to him the only important domain of application of the theory—the problems and the methods of solution of this physical discipline would have a strong relation to the underlying physics. In the same way, statistics, considered as the aggregate of mathematical tools for biometrics, would have a strong relation to biometrics; and biometrics was concerned with socially relevant issues of the eugenic movement in Great Britain. This is the